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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/841,691	04/24/2001	Angelo Mascarenhas	NREL IR# 99-50	4372

23712 7590 07/19/2002

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EXAMINER

JACKSON JR, JEROME

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 07/19/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/841,691

Applicant(s)

MASCARENHAS, ANGELO

Examiner

Jerome Jackson Jr.

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-135 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22-28, 50-58, 67-76, 84 and 106-118 is/are allowed.
- 6) ☒ Claim(s) 1, 29, 30, 33, 34, 39, 40, 45, 59-65, 77-82, 85-88, 119, 120 and 132-135 is/are rejected.
- 7) ☒ Claim(s) 2-21, 31, 32, 35-38, 41-44, 46-49, 66, 83, 89-105 and 121-131 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6. 6) ☐ Other: \_\_\_\_

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,29,30,33,34,39,40,85-88 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kuznetsov et al 4/80.

Kuznetsov teaches simultaneous doping of Bi and N into GaP to increase luminescence. The functional language in claim 1 does not structurally distinguish over Kuznetsov unless applicant can prove that the same function does not occur in Kuznetsov. Claims 1,29,30,33,34,39, 40, are also similarly rejected. Claims 85-88 are rejected because Kuznetsov teaches light emission and one of ordinary skill would easily form a p-n junction device to enable an led.

Claims 59-65,77-82,85-88,119-120, and 132-135, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuznetsov in view of applicant's prior art admissions.

It would have been obvious to one of ordinary skill to have practiced a solar cell with GaP:N:Bi material from Kuznetsov in order to efficiently collect photons of the same energy as the material bandgap. Likewise it would have been obvious to have practiced

tandem solar cell structure to improve efficiency as applicant has admitted in his description of the solar cell prior art. Accordingly, claims 59-65 are rejected. Claims 77-82 are rejected because it would have been obvious to have practiced GaP:N:Bi material from Kuznetsov as a solar cell with a silicon substrate because GaP on Si is well known in the solar cell art, as their lattice constants are similar, and Si is used as bulk substrate material for solar cells. Claims 85-88 and 119-120 are rejected because one of ordinary skill would practice the material of Kuznetsov as an led or laser device as the photoemission is improved with co-doping. Claims 132-135 are rejected because it would have been fundamentally obvious to have practiced a photodiode of Kuznetsov material on a III-V substrate to integrate with other devices or reduce cost.

Claims 30,45 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yamamoto ,JJAP '99.

Yamamoto teaches co-doping ZnO semiconductor. Claims 30 and 45 are broad and do not structurally distinguish over Yamamoto.

Claims 2-21,31,32,35-38,41-44,46-49,66,83,89-105,121-131, objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 22-28,50-58,67-76,84,106-118 are allowed.

Claims reciting material other than GaP:N:Bi or specific concentrations of N and Bi above those present in Kuznetsov are deemed allowable over the art of record.

Beneking is relevant art on isoelectronic doping in III-V material.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerome Jackson Jr. whose telephone number is 703 308 4937. The examiner can normally be reached on t-th 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lee can be reached on 703 308 4915. The fax phone numbers for the organization where this application or proceeding is assigned are 703 308 7722 for regular communications and 703 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

jj  
July 17, 2002

  
JEROME JACKSON  
PRIMARY EXAMINER